THE MATHEMATICS OF AMPUTATION AND INSCRIPTION IN RASMI

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THE MATHEMATICS OF AMPUTATION AND INSCRIPTION IN RASMI

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To Sophia;

The Perpetual Ruler of the Universe

persecuted by Faith. And to Her warriors of Truth,

beacons of hope in the blinding sandstorms of Retrograde

that sweep the face of the Earth. To Hypatia, Baruch

Spinoza, Molla Sadra, Richard Dawkins

And others

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ABSTRACT

Rasmi is the projection of a star polygon onto the surface of a rotating solid. The term is adopted from a form of stellar vault but as expanded through this research proves to be a mathematical phenomenon whose scientific reality exceeds the architectural manifestations. Existing knowledge on *rasmi* comes from two groups of unrelated sources, hence traditional builders and mathematical scholars. This isolation has left many areas of knowledge undocumented in the science of *rasmi*. The objective of this research is to initiate this scientific exploration into the mathematical criteria raised by the procedures and phenomena in the field of *rasmi*. The significance of this research is that it is the first of its kind. The main problems of the research have been formulated into seven mathematical questions within three areas of interest in the analysis of star polygons as the planar manifestations of *rasmi*. These questions are elaborated under two subchapters over Chapter 1 and Chapter 3, and relate to the sum of internal angles and the total number of sequels as the first two, and five other questions on the inscription of *rasmi*s into regular polygons, rectangles and trapezoids. Research data has been generated through AutoCAD for all *polygram* sequels between five and forty-eight. The method adopted by the research comprises of the successive stages of data regrouping, pattern detection, observation, pattern analysis, examination, mathematical redefinition, and formulation. The formula is then tested for universality, the result of which produces a universal or local formula. This research has produced two mathematical axioms, two local formulae for the sum of internal angles for odd and even rasmis each, two local formulae for the number of sequels for odd and even rasmis each, one universal formula for regular inscriptions, three local formulae for rectangles, and four local formulae for trapezoids.

ABSTRAK

Rasmi terbentuk hasil unjuran poligon bintang di atas permukaan pejal yang berputar. Istilah ini diambil dari suatu bentuk kekubah najam tetapi apabila dikembangkan menerusi penyelidikan ini, maka terbukti ia merupakan suatu fenomena matematik yang pada hakikat saintifiknya turut melangkaui manifestasi senibina. Pengetahuan yang sedia wujud berkaitan *rasmi* diperoleh dari dua kumpulan sumber yang terasing iaitu jurubina tradisional dan sarjana matematik. Pengasingan ini telah menyebabkan pelbagai bidang ilmu mengenai sains *rasmi* tidak didokumenkan. Objektif penyelidikan ini bertujuan memulakan penerokaan saintifik keatas kriteria matematik yang terjelma dari prosedur dan fenomena yang menyentuh bidang *rasmi*. Kepentingan penyelidikan ini adalah jelas kerana ia merupakan penyelidikan yang pertama dalam bidang *rasmi*. Masalah teras penyelidikan telah dirumuskan kepada tujuh persoalan matematik sekitar tiga ruang tumpuan dalam analisis poligon bintang sebagai manifestasi rasmi bersatah. Soalan-soalan berkenaan dihuraikan di bawah dua sub-bab merentasi Bab 1 dan 3, yang berkait dengan jumlah sudut dalam dan jumlah nombor turutan sebagai dua soalan yang terawal, manakala lima soalan selebihnya adalah mengenai inskripsi *rasmi* ke dalam poligon, empat segi tepat, dan trapezoid. Data penyelidikan telah dijana menggunakan AutoCAD untuk semua susulan poligram bermula dari lima hingga ke-48. Kaedah yang digunakan dalam penyelidikan ini merangkumi tahap penghimpunan semula data secara berturutan, pengecaman corak, penelitian, analisis corak, pemeriksaan, pendefinisian semula matematik, dan perumusan formula. Formula berkenaan kemudiannya diuji kesejagatannya, dimana keputusan yang terhasil adalah berbentuk formula yang universal dan lokal. Penyelidikan ini menghasilkan dua axiom matematik, dua formula lokal bagi jumlah sudut dalam untuk setiap *rasmi* ganjil dan genap, dua formula lokal bagi sejumlah susulan bagi setiap *rasmi* ganjil dan genap, satu formula universal untuk inskripsi tetap, tiga formula lokal untuk segiempat tepat, dan empat formula lokal untuk trapezoid.